

# Understanding Fertilizer Sales and Reporting Information

## *Workshop Report*

Frederick, Maryland  
May 1, 2007



STAC Publication 07-004



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The Scientific and Technical Advisory Committee (STAC) provides scientific and technical guidance to the Chesapeake Bay Program on measures to restore and protect the Chesapeake Bay. As an advisory committee, STAC reports periodically to the Implementation Committee and annually to the Executive Council. Since its creation in December 1984, STAC has worked to enhance scientific communication and outreach throughout the Chesapeake Bay watershed and beyond. STAC provides scientific and technical advice in various ways, including (1) technical reports and papers, (2) discussion groups, (3) assistance in organizing merit reviews of CBP programs and projects, (4) technical conferences and workshops, and (5) service by STAC members on CBP subcommittees and workgroups. In addition, STAC has the mechanisms in place that will allow STAC to hold meetings, workshops, and reviews in rapid response to CBP subcommittee and workgroup requests for scientific and technical input. This will allow STAC to provide the CBP subcommittees and workgroups with information and support needed as specific issues arise while working towards meeting the goals outlined in the *Chesapeake 2000* agreement. STAC also acts proactively to bring the most recent scientific information to the Bay Program and its partners. For additional information about STAC, please visit the STAC website at [www.chesapeake.org/stac](http://www.chesapeake.org/stac).

**Publication Date:**

October 2007

**Publication Number:**

07-004

Cover photo courtesy of Dr. Mark Alley, Virginia Tech.

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# **Understanding Fertilizer Sales and Reporting Information**

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Technical Advisory Committee  
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## Executive Summary

The Fertilizer Tonnage Reporting to State Chemists was developed to collect fees to fund the consumer protection mission of State Chemists and to track fertilizer sales trends. This system was not designed to track the source of inorganic nutrients/chemical fertilizers applied to agricultural land on the geographic scale needed by the Bay Watershed Model.

However, it is the consensus of the workshop participants that the current system could be refined by each State Department of Agriculture to generate more precise data for improved modeling of watershed-scale nutrient mass balances and (potentially) improve site-specific management of those nutrients.

Recommendations for the State Departments of Agriculture include:

1. Education and outreach to the registrants should be a priority for improving precision of reported tonnage, in particular the separation of non-farm nutrients from farm nutrients with a focus on identifying the smallest practical spatial (geographic) scale possible where nutrients are applied;
2. Staffs should review the nutrient data to assure integrity with agricultural practices in those geographic areas. The data could be refined to reflect available site-specific data layers;
3. Support investigation of additional techniques (and obtain legal authority) to encourage reporting at the retail level where it may be possible (eventually) to collect geographic information about the purchasers.

## Objective

The Chesapeake Bay Model has extrapolated the state Fertilizer Tonnage Reports to calibrate fertilizer applications within the watershed segments of the Bay for each land use. The Agriculture Nutrient Reduction Workgroup of the Chesapeake Bay Program is concerned about the methodology for tracking and reporting fertilizer sales data and the accuracy of information used to represent fertilizer use in the Bay model. The “Understanding Fertilizer Sales and Reporting Information” Workshop is the first step toward reviewing the existing system and providing recommendations for its potential improvements. The Workshop was sponsored by the STAC at the request of the Agriculture Nutrient Reduction Workgroup.

The workshop objective is to provide recommendations for the improvement of the current reporting and tracking system or the development of a more precise site-specific methodology to quantify fertilizer application and use in agricultural and urban landscapes.

## Background

The Bay-wide fertilizer tonnage that is currently being utilized to calibrate the Chesapeake Bay Program Watershed Model could be relatively accurate; however, the county-specific tonnage may have an accuracy of only plus or minus 20 – 50%. For example, in a recent Maryland fertilizer year, 17% of the reported tonnage has been reported without an identified use. Further, we also must be wary that some tonnage may be reported more than once through the distribution chain (double-counting). Finally, another serious concern is that fertilizer reported for agriculture use may actually be used for lawn and turf, forestry, or other non-agriculture applications.

For the states to best focus their resources to improve Bay water quality from nutrient impairments, we need more precise information regarding nutrient applications than provided by the available data.

The goal of this workshop was to bring speakers from agencies, the University of Kentucky, and the fertilizer industry to identify the needs for, and barriers to collecting site-specific agricultural fertilizer application use information.

## Participants

- Greg Adlich, Southern States Cooperative
- Bill Angstadt, Maryland/Delaware Agribusiness Association
- John Bell, PA Farm Bureau
- Warren Bontoyan, Maryland Department of Agriculture
- Karl Brown, Pesticides and Agricultural Chemicals Committee
- John Breitsman, Pennsylvania Department of Agriculture
- Tom Bruulsema, International Plant Nutrition Institute
- Rob Burgholzer, University of Maryland – Chesapeake Bay Program Office
- Janice Bergold Carroll, Delaware Department of Agriculture
- Candice Carter, Southern States Cooperative
- Dean Collamer, Honeywell
- Heather Comegys, Perdue Agricycle
- Don Delorme, Virginia Department of Agriculture
- Mark Dubin, Chesapeake Bay Program Office – Mid-Atlantic Water Quality Program (MAWQP)
- Nina Fisher, Technical Writer
- Dave Hansen, University of Delaware – the Scientific and Technical Advisory Committee
- Bill Herz, The Fertilizer Institute
- Beth Horsey, Maryland Department of Agriculture
- Lyle Jones, Delaware Department of Natural Resources and Environmental Control
- Rick Kirby, Kirby Agri, Inc.
- Karen Lankford, Southern States Cooperative
- Erik Lichtenberg, University of Maryland

- Josh McGrath, University of Maryland
- Mark Miller, US Department of Agriculture - National Agricultural Statistics Service
- Russ Perkinson, Virginia Dynamics Research Corporation
- Marel Raub, Chesapeake Bay Commission
- Harold Reetz, International Plant Nutrition Institute/Foundation for Agronomic Research
- Adrian Robinson, GrowMarkFS
- David Terry, University of Kentucky
- Fred Samadani, Maryland Department of Agriculture
- Jennifer Schaafsma, Maryland Department of Agriculture
- Mary Ellen Setting, Maryland Department of Agriculture
- Darlene Stading, Southern States Cooperative
- Jeff Sweeney, University of Maryland – Chesapeake Bay Program Office
- Becky Thur, Chesapeake Research Consortium
- Elizabeth Van Dolah, Chesapeake Research Consortium
- Jennifer Volk, Delaware Department of Natural Resources and Environmental Control
- Rachel Waldruff, Delaware Department of Agriculture
- Sarah Weammert, University of Maryland

#### Speakers – Notes

*(Ed. Note: please refer the following website to review all workshop presentations: [www.chesapeake.org/stac/fertilizerdataworkshop.html](http://www.chesapeake.org/stac/fertilizerdataworkshop.html))*

1. “Current Calculations of Fertilizer Sales in the Bay Model”  
*Robert W. Burgholzer, University of Maryland - Chesapeake Bay Program Office (CBPO)*
  - The Chesapeake Bay Model is a management tool that can represent the effects of varying fertilizer application rates on agricultural lands in the watershed.
  - Chesapeake Bay Model assumptions for fertilizer sales:
    - ◆ State tonnage reports reflect fertilizer sales for the Chesapeake Bay Watershed; any fertilizer exports out of the Watershed are equal to any fertilizer imports.
    - ◆ Using a “Control Volume” calculation method spreads applications across entire watershed according to crop need, as determined from Ag census/ National Agriculture Statistics Service (NASS) yield reports (<ftp://ftp.chesapeakebay.net/Nutrient/Section-5.5.1.1.doc>).
  - Data will be used to determine the relative rates of changing fertilizer application over the model period.

- Main Model Variables:
  - ◆ Relative application rate estimation (derived from crop rotations, areas under cultivation, double cropping)
  - ◆ Actual rate estimation (inorganic nutrient applications on hay, legumes, pasture; nutrients applied from organic sources; changes in crop yield potential over time. There remain uncertainties about legumes as a percentage of hay stands and fertilizer sales data.)
  - ◆ Effects of Nutrient Management Plans (current versus historic data)
- Model Data/Output Summary:
  - ◆ There has been a downward trend in mean crop nitrogen removal since 1997 due to the loss of acreage; however, on a per acre basis, there was a small peak in crop nitrogen need in 1997.
  - ◆ No significant trend is present for nitrogen fertilizer sold over time; Phosphorus fertilizer sales fell 20% from 1992 – 2002.
  - ◆ Manure nitrogen application trends have declined over time while manure phosphorus application remained steady through 2001 and fell after phytase poultry feed amendments began in 2002.
  - ◆ Fertilizer application trends have decrease slightly over time for total nitrogen; fertilizer application trends significantly decline for total phosphorus over time, with an accelerated decline after phytase use began.
  - ◆ With nutrient management (fertilizer sales only) assumed, nitrogen sales were predicted to decrease by 10%, but no significant decline in sales trends was detected. Phosphorus sales were predicted to decrease by 27%; actual sales trends show a 20% decrease.
  - ◆ Most nitrogen use reductions can be linked to declining manure nitrogen application, but not fertilizer sales declines. Currently the model is unable to determine if nutrient management has an impact on marginal nitrogen use rates.
  - ◆ Phosphorus reductions can be linked to a decrease in fertilizer sales of phosphorus.
  - ◆ Relative trends in application rates (lbs/acre) are defensible, but changes in crop yield over time are the most important piece of input data for model estimates of use.

## 2. “Current AAPFCO approach to Sales Data Collection”

*Dr. David Terry, University of Kentucky*

Each Bay state has a fertilizer tonnage reporting requirement set up for the collection of fees and for tracking trends in their individual states. Additionally, each state follows the Uniform Fertilizer Tonnage Reporting System protocols (UFTRS) adopted in 1967 by the Association of American Plant Food Control Officials (AAPFCO).

- Summary of the Issues:
  - ◆ Classification of farm and non-farm use should be improved as these uses are not always the same across states; some states do not make the effort to distinguish between farm and non-farm use.
  - ◆ A report is made when a registrant sells to a distributor or dealer (non-registrant). This is usually reported as the distribution point and not necessarily where the product is applied.
  - ◆ Some states allow reporting of sales to blenders, which may introduce time lags and does not capture the mixes that are sold—only the materials.
  - ◆ Secondary nutrients and micro-nutrients are reported as materials rather than in blends.
  - ◆ Exchanges between registrants are exempted.
  - ◆ The report carries labeled nutrient content (i.e., 10-10-10), but not the actual content. There is a possibility of over-formulation in the blend, but this is assumed to be insignificant because of QA/QC procedures and penalties that would be imposed for inappropriately labeled materials.
  - ◆
- Improvements that AAPFCO is considering:
  - ◆ Can we use zip code reporting at the last sale point (registrant to non-registrant) to get county-specific use data?
  - ◆ Can we use an excel spreadsheet in addition to text files for importing data, or some other more flexible method?

### 3. “Current Regulatory Tonnage Accounting System”

*Darlene Stading, Southern States Cooperatives*

- Southern States Cooperatives (SSC) captures data in two reports:
  - ◆ Farm & Home Report (for packaged items that display the SSC label); system acknowledges the ship-to-address (county of retail location)
  - ◆ Fertilizer Report
- Elements of these include:
  - ◆ Reporting for 26 different states, each with unique reporting requirements
  - ◆ fertilizer sales are reported, but fertilizer/pesticide mixtures are not captured in the reports
  - ◆ Consistency between state reports is currently lacking and would be of great benefit to SSC
  - ◆ SSC retail stores do not collect inspection fees from other registered/licensed wholesale retailers or blenders because the sellers are expected to do so themselves.
- Reporting at a retail level takes considerably more time and is only done for two states. SSC does not currently have the capacity to do this for all states (GrowMaster Services, a service that SSC actively uses to help prepare



personalized plans for managing customers' crop inputs, does not interface with states reporting systems, forcing much of the data to be entered manually).

- 10-10-10 is the biggest product sold, but the intended use of the product is not known; farm-use is the default in the UFTRS system.

#### 4. "Viewpoint of Fertilizer Distributor"

*Rick Kirby, Kirby Agri, Lancaster PA*

The fertilizer industry has evolved from ammoniated complete fertilizer ( 10-10-10, 5-10-10) distribution in the 1960s, to blends using urea, DAP, and potash in the 1970s to improve blend quality, soil sampling, and crop consulting in the 1980s. By the 1980s, there were sufficient retail locations where fertilizer distribution was isolated to users in a radius of 5 – 10 miles. With the consolidation to larger farms, a retail location is more likely to distribute across several counties and non-farm markets. Farmer specialization has increased the demand for customized nutrient analyses for each crop need.

- Kirby Agri adds the tonnage tax to invoices to non-registrant purchasers (farmers and dealers).
- Airports and other industrial users also purchase materials (i.e. urea), but it is fairly insignificant. Urea that has been reported as fertilizer may actually be used as ice melt and feed ingredients.

#### 5. "Protocols for Farming Reporting"

*Mark R. Miller, USDA National Agricultural Statistics Service (NASS)*

- NASS surveys farmers in six program areas: field crops, fruits and vegetables, nurseries/floriculture, livestock use, and post-harvest application.
- NASS collects fertilizer, pesticide, and pest management data every year on a stratified random sample of farmers at the field level. One field represents an entire farm for each sample for the field crops survey. Fruit and vegetable data is collected for the entire farm.
- If the field chosen for sampling has had manure applied in conjunction with inorganic fertilizer, only the inorganic portion will be reported in surveys.
- Core crops are surveyed every other year on even/odd basis for different crops (NASS is not surveying corn in 2007 because of funding; therefore, surveys will be missing for two corn years in a row; NASS will try to resume in corn coverage in 2008).
- NASS selects states to cover over 80% of planted acres and will increase samples when other states contribute funds to the program.
- Confidentiality requirements are very strict: NASS will not divulge information for an individual; at least five complete reports are required for sufficient data for statistical analyses.

- The response rate approximates 70% for hour-long surveys with farmers.
- Results are published by political boundaries, with the state-level being the smallest level; county-level results may be possible if there are enough surveys in the state.
- Survey costs are \$200 – \$250 per farm interview.

#### 6. “GIS Protocols”

*Dr. Harold Reetz, Foundation for Agronomic Research*

- The Nutrient Use Geographic Information System (NuGIS):
  - ◆ compares nutrient use by state or by 3-digit zip code using critical threshold values set by state university systems;
  - ◆ and creates county nutrient budgets using multiple data sources and aggregates those budgets on a watershed basis using 8-digit hydrologic units
- There is a need for a consistent system for tracking fertilizer sales (documentation of where applied), for funding to support more frequent and more intensive data collection, and for new technology (remote sensing imagery, GIS data management, enhanced models)
- The Foundation for Agronomic Research proposed a two-day conference in Beltsville in 2008 on technology applications, economics, environment, etc. with one day of field demonstrations

#### Participant Dialog

W. Angstadt, Delaware Maryland Agribusiness Association (DMAA): There are gaps in the State Tonnage Reporting systems, mixed reporting criteria at all levels of distribution; tonnage may be going out-of-state; separating farm vs. non-farm use is not done, but is needed (by tons and actual pounds of nitrogen and phosphorus distributed).

J. Bell, Pennsylvania Farm Bureau: Manure nutrient data require the same precision that is being sought for fertilizer nutrients.

E. Horsey, Maryland Department of Agriculture, MDA (Maryland Department of Agriculture): To manage nutrients within our Tributary Strategies, we need to know more precisely the amount of nutrients being applied.

R. Perkinson, Virginia Department Department of Conservation and Recreation (VA DCR): There is an apparent need to push down (?) the present scale of reporting.

F. Samadani, Maryland Department of Agriculture (MDA): Suggested three steps to provide more reliable data on fertilizer use in the Bay watersheds, mass balance calculations, and nutrient budget:

1. Identify the basic information/data needs on nutrients sales (quantified as N and P<sub>2</sub>O<sub>5</sub>) and their use for agricultural and non-agricultural societal segments (separately) by watershed;
2. Modify the current reporting system or develop a new software program for recording and reporting fertilizer sales (N & P<sub>2</sub>O<sub>5</sub>) for specific uses (agriculture or non-Ag) in specific sites/watersheds, and electronic reporting ideally through a web-based system;
3. Identify who has responsibility to “Track & Report” the required information (as specified above). Is there a need for regulation/policy change?

Fertilizer industry comments (R. Kirby, W. Angstadt, A. Robinson, Growmark FS):

The perfect data exist – every pound of fertilizer sold has an invoice to someone and each farmer knows exactly the amount of N and P applied to each field; this information is reconcilable, but the cost of collection is currently prohibitive.

The potential for collection of agricultural fertilizer use data from producers was discussed (including the listed options), but dismissed by the group as not feasible any time in the near future because of cost, time, and confidentiality requirements. Therefore, can the current system be refined to generate more precise data? The following reporting issues were discussed:

Farm/Field/Consumer Level	State/County Level
<ul style="list-style-type: none"> <li>• Farm surveys (Bay-wide system)</li> <li>• Compile nutrient management plans into data on actual nutrient and phosphorus use</li> <li>• Farmer responsibility for reporting</li> <li>• Short questionnaire at point-of-sale on use intentions and location</li> </ul>	<ul style="list-style-type: none"> <li>• Zip code reporting</li> <li>• Data cleansing</li> <li>• Improve agriculture vs. non-agriculture tonnage sales               <ul style="list-style-type: none"> <li>◆ Allocation of end-use of fertilizer</li> <li>◆ Modifications</li> <li>◆ Who should report?</li> <li>◆ What information do we need?</li> <li>◆ Auditing to improve data quality</li> </ul> </li> <li>• Regulation/policy changes in all states through legislation</li> <li>• Gather more registrant distribution data and extrapolate to nearby areas within which they are willing to travel</li> </ul>

Post-Workshop Comments: Karl G. Brown, Executive Secretary, Pennsylvania State Conservation Commission

**Subject:** RE: STAC Fertilizer Workshop Report  
**Date:** 5/9/2007 10:30:11 A.M. Eastern Daylight Time  
**From:** [kbrown@state.pa.us](mailto:kbrown@state.pa.us)

Thanks for the opportunity to take a look at these. The following are a few quick observations ...

The increased cost of precision – The Executive Summary (ES) and the report includes a number of recommendations of what could or should be done to collect “more precise data points” that the Bay Model needs. Whether [through] the public sector or the private sector, or both, [there will be costs to provide a more precise data set]. Southern States discussed this to a limited degree in their comments from a private sector perspective and I think most of the regulatory agencies that spoke raised the fact that greater precision will mean greater cost at some point in the chain. Whether it is increased education of registrants, reviewing the data to assure integrity, cleansing data or collecting end use data, all will require additional resources from some source. Given the fact that some folks may read only the ES, this would be an important point to include in the ES.

Legal and Regulatory Limitations – It is good that the first statement in the ES recognizes that the current system feeding fertilizer sales data to the CBP model was never intended or designed to do what the CBP model is asking it to do. State agencies responsible for tracking fertilizer sales do so within the current legal parameters of their authorizing statutes. Asking them to collect info and data on things like the “geographic scale of nutrient applications” (actual geographic use data) may be outside the scope of their current legal authorities, either by regulation or by statute.

“Cleansed” Data – If nothing else this may not be the best word choice. Some may perceive this as the CBP model manipulating the data in some fashion.

Consensus - If I recall correctly, the agenda indicated that one of the “Potential Actions” for the meeting was a “consensus building discussion”. While the meeting generated a greater understanding of the issues and challenges that are faced in this area, I would be hesitant to state that “consensus” was reached on any corrective actions. The closest point of consensus was the second to last statement of the document which states, “The potential for collection of agricultural fertilizer use data was discussed (including the options listed), but was dismissed by the group as not feasible any time in the near future because of cost, time, and confidentiality.” I believe that developing general consensus on potential actions to move us towards more precise fertilizer use data will take additional time and work.

Overall the meeting had good discussion and presented good information. Bottom line is [that] coming to consensus on these issues will take time.

## Post-Workshop Comments: John Breitsman, PA Department of Agriculture

**Subject:** Chesapeake Bay Program STAC Fertilizer Data Workshop  
**Date:** 5/7/2007 3:07:30 P.M. Eastern Daylight Time  
**From:** [jbreitsman@state.pa.us](mailto:jbreitsman@state.pa.us)

The fertilizer tonnage information that is collected for each of the state regulatory program is for the purpose of fertilizer distribution and sales. This information is reported to assist the fertilizer industry in modeling and tracking fertilizer sales trends. You and several others involved in this project have indicated that the nutrient information desired for this Bay project is actual use information. It appeared from the presenters at your workshop that the NASS survey program would be the best way to obtain the accurate watershed data that you need rather than any modification of fertilizer distribution information.

In Pennsylvania, the only information that we can obtain by statute is county information, net tons, and grade. In addition, we are not allowed to release proprietary information which could impact some grade reporting. The information collected works well for its intended purpose. The tonnage data does not appear to meet the needs for usage information.

Further modifying a tonnage reporting system that was not designed to collect fertilizer usage information may give you some small measure of more accurate fertilizer distribution and sale information, not the usage information that you need. I would suggest that you work toward your goal of obtaining the fertilizer use information that you desperately desire to make the most accurate nutrient modeling for the Bay.

Thank you for sharing the minutes of the workshop and requesting our feedback.

Post-Workshop Comments: John J. Bell, Governmental Affairs Counsel, Pennsylvania Farm Bureau

Date: May 9, 2007

I was forwarded a copy of the draft report of the May 1 workshop, and noticed that I was included among those who offered commentary in the *Participants Dialogue* section of the report. While I recognize that the draft report's summary of commentary I offered at the workshop is not necessarily inaccurate, I'm afraid that without some description of the context in which the commentary was made, the statement contained in the draft report may be misinterpreted as suggesting something that I did not intend to suggest.

If you recall, the context in which my statements were offered at the workshop was the Chesapeake Bay Model's quantification of contributors to nutrient pollution to the Bay, degree of loadings attributed to each contributor in the Model, and the Model's assignment of benefit effects in nutrient loading reduction from implementation of best management practices. My comment for "greater precision" was attempting to express the belief shared by many of us that the Model's picture of pollution contribution does not accurately reflect the reality of effects actually taking place in Pennsylvania's Chesapeake Bay watershed.

My questions regarding "legacy sediment" and other conditions and activities that may be contributing in actuality a greater degree of nutrient loadings than are measured in the CB Model and to the capturing in the CB Model of best management practices being performed but not recognized or accurately recognized in the CB Model were all intended to suggest that *there needs to be greater precision in the Model* [italics added by ed.] for measuring the contribution and benefits of manure management practices and other conditions and activities pertaining to nutrient loadings and control.

Without some context, some may read the report's summary of my commentary as suggesting that there needs to be "greater precision" in the production of data through creation and development of reporting systems, including greater infrastructure (and potential mandates) for reporting of manure usage by farmers. Consistent with my negative comments at the workshop to suggestions by others to expand the scope of fertilizer reporting to include reporting at the farm level, I was certainly not suggesting that farmers need to report more as part of the effort to obtain "greater precision" in manure data.

If my memory serves me, we did get into a discussion at the workshop of the Model's failure to specifically capture the substantial efforts being performed in PA to transport manure generated within the Bay watershed out of the watershed area. To the extent feasible, such efforts should be captured and credited in the Model.